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APPLICANT: Louis BIGO et al.)
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TITLE: A TAPPING CIRCUIT INCLUDING A TAPPING VALVE FOR
REPLENSHING AND/OR FLUSHING THE CASING OF A
HYDRAULIC MOTOR

THE COMMISSIONER FOR PATENTS
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AMENDED CLAIMS

1-15 (cancelled)

16. (previously presented) A hydraulic circuit including a main fluid circuit which comprises:

a hydraulic motor having a preferred operating direction and having a casing which defines an internal space and in which a cylinder block is disposed, and at least two main pipes suitable for being put in communication with the cylinder block of the motor and constituting respectively, in the preferred operating direction of said motor a feed main pipe and a discharge main pipe;

the hydraulic circuit further comprising a tapping circuit including means for tapping fluid from the main circuit and means for removing the tapped fluid to a reservoir under atmospheric pressure via a removal pipe;

said tapping circuit further comprising a single tapping and removal valve connected continuously via a tapping pipe to a single one of said main pipes, the valve also being connected to the removal pipe, the tapping and removal valve being connected to the discharge main pipe in the preferred operating direction of the motor;

the tapping and removal valve comprising:

a flow-rate regulator that includes a slide mounted to move in a body,

a hydraulic control chamber suitable for being fed with fluid via the tapping pipe to urge the slide to move in a first displacement direction; and

resilient return means suitable for urging the slide to move in a second displacement direction opposite from said first displacement direction;

wherein one of the elements constituted by the body and by the slide has at least one communication orifice, while the other of said elements has a closure wall suitable for masking said orifice as a function of the position of the slide, a communication passageway between the tapping pipe and the removal pipe being open when said orifice is not masked by said closure wall; and

wherein the communication orifice has a length, as measured in the displacement direction of the slide, that is less than the stroke of said slide, said orifice being masked by the closure wall when the slide is in its two end positions so that said communication passageway is opened only when the pressure difference between the tapping pipe and the removal pipe is greater than a threshold value and is less than a limit value.

17. (previously presented) A hydraulic circuit according to claim 16, wherein the tapping and removal valve has means for opening the communication passageway only when the pressure difference between the tapping pipe and the removal pipe is at least equal to the threshold value, wherein the resilient return means urges the slide continuously to return towards a position in which the communication passageway is closed off, and wherein said means are calibrated so as to allow said passageway to be opened only when the pressure in the control chamber reaches the threshold value.

18. (new) A hydraulic circuit including a main fluid circuit which comprises:

a hydraulic motor having a preferred operating direction and having a casing which defines an internal space and in which a cylinder block is disposed; and

at least two main pipes suitable for being put in communication with the cylinder block of the motor and constituting respectively, in the preferred operating direction of said motor a feed main pipe and a discharge main pipe;

the hydraulic circuit further comprising a tapping circuit including means for tapping fluid from the main fluid circuit and means for removing the tapped fluid to a reservoir under atmospheric pressure via a removal pipe;

said tapping circuit further comprising a single tapping and removal valve connected continuously via a tapping pipe to a single one of said main pipes, the valve also being connected to the removal pipe, the tapping and removal valve being

connected to the discharge main pipe in the preferred operating direction of the motor;

said tapping and removal valve having a communication passageway between the tapping pipe and the removal pipe, said valve including means for causing the cross-sectional area of said passageway to vary continuously as a function of the pressure difference between the tapping pipe and the removal pipe;

wherein the tapping and removal valve has means for opening the communication passageway only when the pressure difference between the tapping pipe and the removal pipe is at least equal to a threshold value.

19. (new) A hydraulic circuit according to claim 18, wherein the tapping and removal valve comprises a flow-rate regulator having at least one inlet suitable for communicating with the tapping pipe, an outlet suitable for communicating with the removal pipe, a constriction interposed between said inlet and said outlet, and means for causing the cross-sectional area of the passageway between the inlet and the outlet to vary in relation with the head loss through said constriction.

20. (new) A hydraulic circuit according to claim 19, wherein the flow-rate regulator comprises a slide mounted to move in a body, a hydraulic control chamber suitable for being fed with fluid via the tapping pipe to urge the slide to move in a first displacement direction, and resilient return means suitable for urging the slide to move in a second displacement direction opposite from said first displacement direction, and wherein one of the elements constituted by the body and by the slide has at least one communication orifice, while the other of said elements has a closure wall suitable for masking said orifice as a function of the position of the slide.

21. (new) A hydraulic circuit according to claim 20, wherein the constriction is situated in the slide, and it forms a passageway between the hydraulic control chamber and the outlet.

22. (new) A hydraulic circuit according to claim 18, wherein said means for opening the communication passageway are calibrated so as to allow said passageway to be opened only when the pressure in the control chamber reaches the threshold value.

23. (new) A hydraulic circuit according to claim 18, wherein the removal pipe is connected continuously to the internal space of the hydraulic motor via an injection segment which is provided in a cover portion of said motor, and wherein the circuit further comprises a pipe for connection to a reservoir under atmospheric pressure

connected to the internal space of the motor via a leakage return orifice of said motor.

24. (new) A hydraulic circuit according to claim 23, wherein the tapping and removal valve is contained in a cartridge suitable for being mounted on said cover portion by being connected to said injection segment.

25. (new) A hydraulic circuit according to claim 18, wherein said means for opening the communication passageway are calibrated so as to allow said passageway to be opened only when the pressure difference between the tapping pipe and the removal pipe is greater than a threshold value and is less than a limit value.

26. (new) A hydraulic circuit according to claim 25, wherein said means for opening the communication passageway comprising the communication orifice has a length, as measured in the displacement direction of the slide, that is less than the stroke of said slide, and said orifice being closed by the closure wall when the slide is in its two end positions.

27. (new) A hydraulic circuit according to claim 25, wherein the removal pipe is connected continuously to the internal space of the hydraulic motor via an injection segment which is provided in a cover portion of said motor, and wherein the circuit further comprises a pipe for connection to a reservoir under atmospheric pressure connected to the internal space of the motor via a leakage return orifice of said motor.

28. (new) A hydraulic circuit according to claim 27, wherein the tapping and removal valve is contained in a cartridge suitable for being mounted on said cover portion by being connected to said injection segment.

29. (new) A hydraulic circuit including a main fluid circuit which comprises:
a hydraulic motor having a preferred operating direction and having a casing which defines an internal space and in which a cylinder block is disposed; and
at least two main pipes suitable for being put in communication with the cylinder block of the motor and constituting respectively, in the preferred operating direction of said motor a feed main pipe and a discharge main pipe;
the hydraulic circuit further comprising a tapping circuit including means for tapping fluid from the main fluid circuit and means for removing the tapped fluid to a reservoir under atmospheric pressure via a removal pipe;

said tapping circuit further comprising a single tapping and removal valve connected continuously via a tapping pipe to a single one of said main pipes, the valve also being connected to the removal pipe, the tapping and removal valve being connected to the discharge main pipe in the preferred operating direction of the motor;

said tapping and removal valve having a communication passageway between the tapping pipe and the removal pipe, said valve including means for causing the cross-sectional area of said passageway to vary continuously as a function of the pressure difference between the tapping pipe and the removal pipe; and

further comprising a receiver which has an inlet connected to an auxiliary outlet of the tapping and removal valve, and which feeds at least one auxiliary circuit with fluid under pressure.

30. (new) A hydraulic circuit according to claim 29, wherein the tapping and removal valve comprises a flow-rate regulator having at least one inlet suitable for communicating with the tapping pipe, an outlet suitable for communicating with the removal pipe, a constriction interposed between said inlet and said outlet, and means for causing the cross-sectional area of the passageway between the inlet and the outlet to vary in relation with the head loss through said constriction.

31. (new) A hydraulic circuit according to claim 30, wherein the flow-rate regulator comprises a slide mounted to move in a body, a hydraulic control chamber suitable for being fed with fluid via the tapping pipe to urge the slide to move in a first displacement direction, and resilient return means suitable for urging the slide to move in a second displacement direction opposite from said first displacement direction, and wherein one of the elements constituted by the body and by the slide has at least one communication orifice, while the other of said elements has a closure wall suitable for masking said orifice as a function of the position of the slide.

32. (new) A hydraulic circuit according to claim 31, wherein the constriction is situated in the slide, and it forms a passageway between the hydraulic control chamber and the outlet.

33. (new) A hydraulic circuit according to claim 29, wherein the removal pipe is connected continuously to the internal space of the hydraulic motor via an injection segment which is provided in a cover portion of said motor, and wherein the circuit further comprises a pipe for connection to a reservoir under atmospheric pressure

connected to the internal space of the motor via a leakage return orifice of said motor.

34. (new) A hydraulic circuit according to claim 33, wherein the tapping and removal valve is contained in a cartridge suitable for being mounted on said cover portion by being connected to said injection segment.

35. (new) A hydraulic circuit including a main fluid circuit which comprises:

a hydraulic motor having a preferred operating direction and having a casing which defines an internal space and in which a cylinder block is disposed; and

at least two main pipes suitable for being put in communication with the cylinder block of the motor and constituting respectively, in the preferred operating direction of said motor a feed main pipe and a discharge main pipe;

the hydraulic circuit further comprising a tapping circuit including means for tapping fluid from the main fluid circuit and means for removing the tapped fluid to a reservoir under atmospheric pressure via a removal pipe;

said tapping circuit further comprising a single tapping and removal valve connected continuously via a tapping pipe to a single one of said main pipes, the valve also being connected to the removal pipe, the tapping and removal valve being connected to the discharge main pipe in the preferred operating direction of the motor;

said tapping and removal valve having a communication passageway between the tapping pipe and the removal pipe, said valve including means for causing the cross-sectional area of said passageway to vary continuously as a function of the pressure difference between the tapping pipe and the removal pipe;

wherein the main circuit is a closed circuit, and wherein the tapping and removal valve is a flushing valve, the tapped fluid being removed to be cooled.

36. (new) A hydraulic circuit according to claim 35, wherein the tapping and removal valve comprises a flow-rate regulator having at least one inlet suitable for communicating with the tapping pipe, an outlet suitable for communicating with the removal pipe, a constriction interposed between said inlet and said outlet, and means for causing the cross-sectional area of the passageway between the inlet and the outlet to vary in relation with the head loss through said constriction.

37. (new) A hydraulic circuit according to claim 36, wherein the flow-rate regulator comprises a slide mounted to move in a body, a hydraulic control chamber suitable for being fed with fluid via the tapping pipe to urge the slide to move in a first

displacement direction, and resilient return means suitable for urging the slide to move in a second displacement direction opposite from said first displacement direction, and wherein one of the elements constituted by the body and by the slide has at least one communication orifice, while the other of said elements has a closure wall suitable for masking said orifice as a function of the position of the slide.

38. (new) A hydraulic circuit according to claim 37, wherein the constriction is situated in the slide, and it forms a passageway between the hydraulic control chamber and the outlet.

39. (new) A hydraulic circuit according to claim 35, wherein the removal pipe is connected continuously to the internal space of the hydraulic motor via an injection segment which is provided in a cover portion of said motor, and wherein the circuit further comprises a pipe for connection to a reservoir under atmospheric pressure connected to the internal space of the motor via a leakage return orifice of said motor.

40. (new) A hydraulic circuit according to claim 39, wherein the tapping and removal valve is contained in a cartridge suitable for being mounted on said cover portion by being connected to said injection segment.